

Air Pollutants and Traffic



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anyone who is still confused as to what this
whole Geographic Information Science" thing
is, yeah, this is what I'm doing now

Noise, air pollutants and traffic: Continuous measurements and correlation at
a high-traffic location in New York City

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Purpose

- Studies have linked both noise and air pollution to health problems such as
 - High Blood Pressure
 - Myocardial Infarction
- In Urban settings there is a spatial correlation between Noise and Air Pollution
- Temporal correlation needs exploring
- Traffic

Temporal

- **tem·po·ral**
- ¹ [tem-per-uhl, tem-pruhl]
- ***adjective***1.of or pertaining to time.
- **2.**pertaining to or concerned with the present life or this world;worldly: *temporal joys*.
- *Focus is on time of occurrence of noise and Air Pollution*

Methods

- An Aethelometer
- Continuous elemental carbon measurement
- Located near a Major urban Highway in NYC
- Six Days in August 2009



Elemental Carbon (EC)

What is it?

- -Extended Aromatic Rings of Carbon Atoms
- -Black (absorbs all visible light radiation)
- (Degenerate Resonance Pi-bond electrons
- in conductance bands; Metal-like)
- -Refractory (does not melt or sublime,
- even at high temperatures; $>2000\text{ C}$)
- - Insoluble and Chemically inert at normal
- temperatures

Methods

Song Meter-Wildlife
Acoustics

Field Recorder

- Records multi-level frequencies
- WAV Format
- SD Card



Song Meter-Mounted





Results

Results: Noise levels were correlated with car, truck, and bus traffic and with air pollutants. We observed strong day–night and weekday–weekend variation in noise and air pollutants and correlations between pollutants varied by noise frequency. Medium and high frequency noise were generally more strongly correlated with traffic and traffic-related pollutants than low frequency noise and the correlation with medium and high frequency noise was generally stronger at night. Correlations with nighttime high frequency noise were particularly high for car traffic (Spearman $\rho=0.84$), nitric oxide (0.73) and nitrogen dioxide (0.83). Wind speed and direction mediated relationships between pollutants and noise.

Conclusions: Noise levels are temporally correlated with traffic and combustion pollutants and correlations are modified by the time of day, noise frequency and wind. Our results underscore the potential importance of assessing temporal variation in co-exposures to noise and air pollution in studies of the health effects of these urban pollutants.

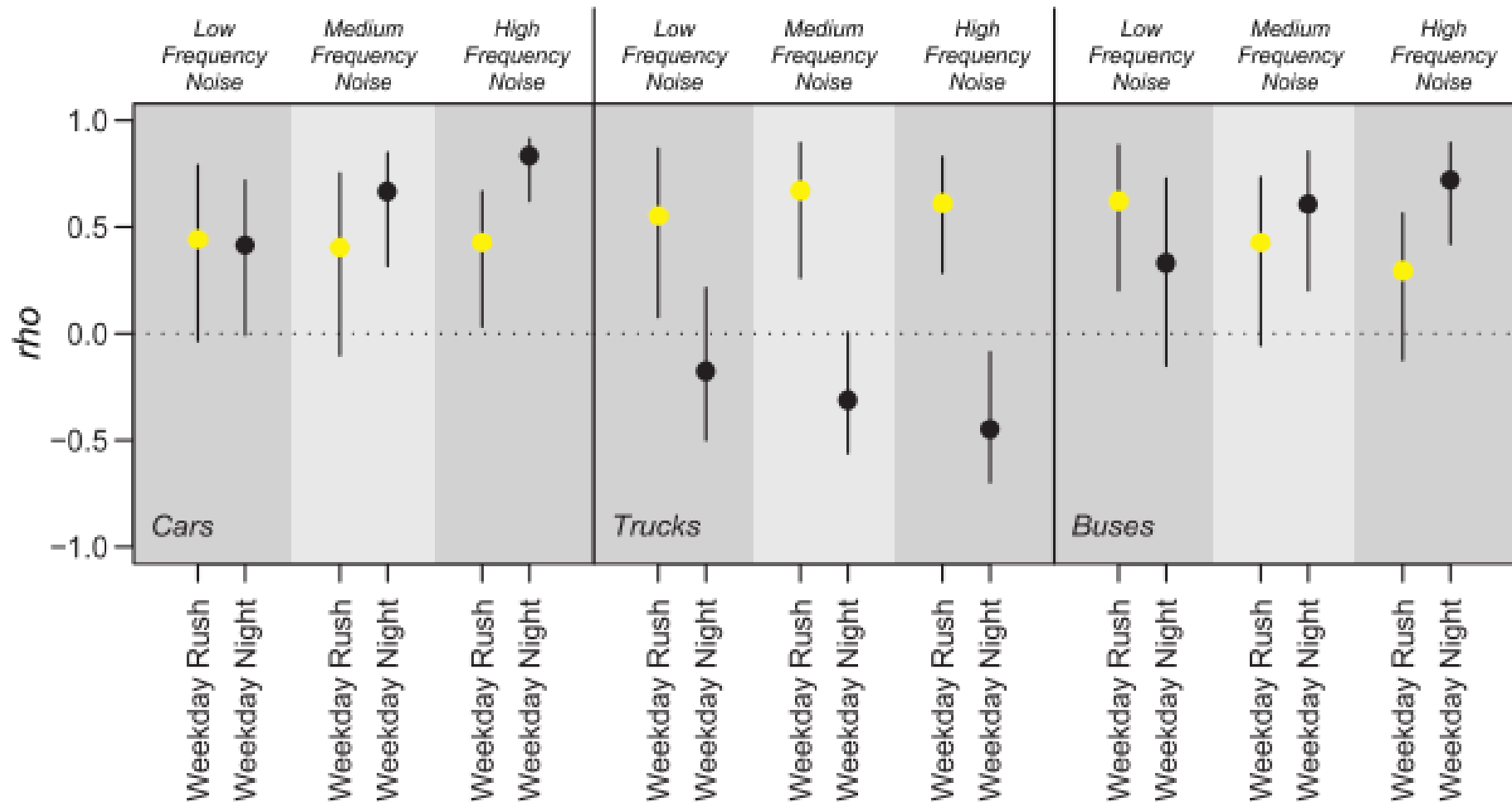
Analysis of sound results

- Large differences between day and night sound levels during weekdays
- Large differences between weekday and weekend sound levels
- Large differences between day and night sounds on weekend

Analysis of sound results

- Daytime **maximum** traffic levels were 4-7 X greater than night time **minimum** levels
- Weekdays and Weekend exhibited dramatic traffic increases in the morning hours
- (6-10am) Weekdays...later on weekends
- Evening rush peaked at 7pm
- 7pm weekdays-loudest time

Sound Variance



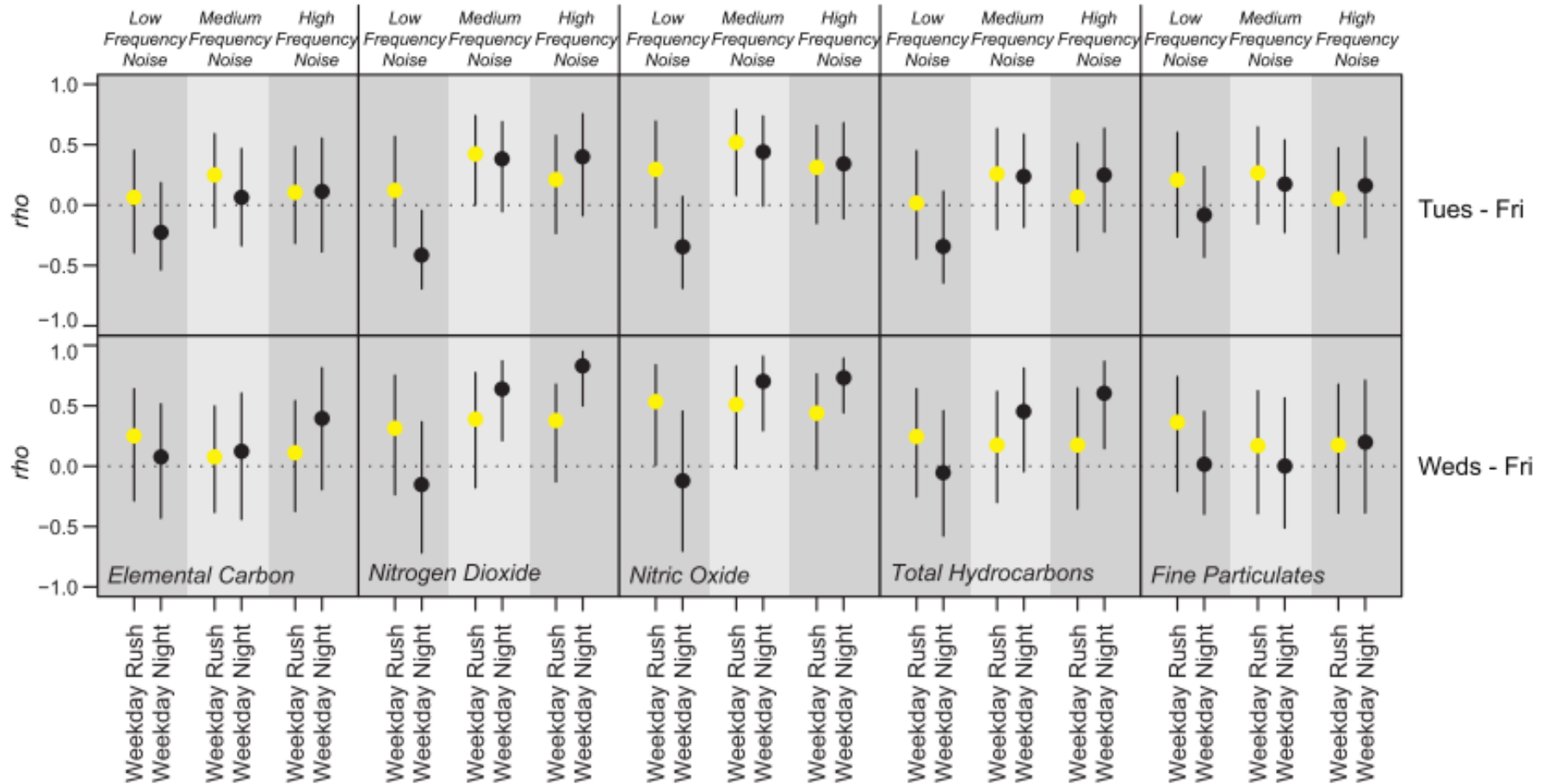
Analysis of Pollutants

- Similar to sound
- Day to night variance
- Weekend to weekday variance
- All five pollutants measured were highest on weekdays

Pollutants measured

- Elemental Carbon
- Nitrogen Dioxide
- Nitric Oxide
- Total Hydrocarbons
- Fine Particulate Matter

Pollutant Variance



Conclusion

- Definite correlation between Noise level and level of pollutants present
- Information obtained in research aimed at furthering medical research
- Compounding effect noise, movement, and pollutants in urban setting